LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BARTHOLOMEW LAKE

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED PERIODICALLY

September 2012 - Prepared by

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February 2015 - Updated by R. Daniel

February 2018 - by Updated R. Daniel

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts.

Commercial

Although species comprising a commercial fishery exist in Bartholomew Lake, their low abundance would likely not sustain a fishery, especially since most commonly used commercial gears are not permitted.

Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations are in effect for all fish species.
http://www.wlf.louisiana.gov/regulations

Commercial

Commercial fish netting is prohibited. Effective September 20, 1991, gill nets, trammel nets, hoop nets, and fish seines were prohibited by legislative statute in conjunction with the implementation of a harvest regulations for black bass. The bass regulations have since been rescinded. http://www.wlf.louisiana.gov/regulations

SPECIES EVALUATION

Recreational

Largemouth bass, *Micropterus salmoides*, are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish. Sampling with gill nets determines the status of large bass and other large fish species. Shoreline seining has been used in the past to collect information related to fish reproduction and forage availability.

Largemouth Bass

Largemouth Bass CPUE and Length Frequency

In the chart below (Figure 1), fall electrofishing data is used as an indicator of largemouth bass relative abundance with total catch-per-unit-of-effort (CPUE) indicated for three size classes since 1991. There appears to be a trend of declining abundance in all three size classes since 1999. A partial explanation could be the removal of the 14 – 17-inch slot limit in 2000, which allowed for the harvest of fish within this size range. The most recent sample (2016) showed a significantly lower CPUE, though sampling equipment error was believed to be a factor in this sample. The spring sample followed the historic flood of March 2016, which must also be considered when explaining the results. Figure 2 depicts CPUE from spring electrofishing samples over the same period of time. The trend is similar, although not as pronounced. Year-to-year variability can often be explained by sampling error; thus it is necessary to evaluate multiple samples over an extended period of time to conclude any trends. Note that the spring 2013 sampling results portray a much higher abundance than the fall. Fall sampling results show an overall decline in bass abundance since 2001, whereas spring samples show an overall increase since 2001, with the exception of 2016. Also, sampling frequency was decreased to every third year after 2001, rather than every other year from 1991 - 2001.

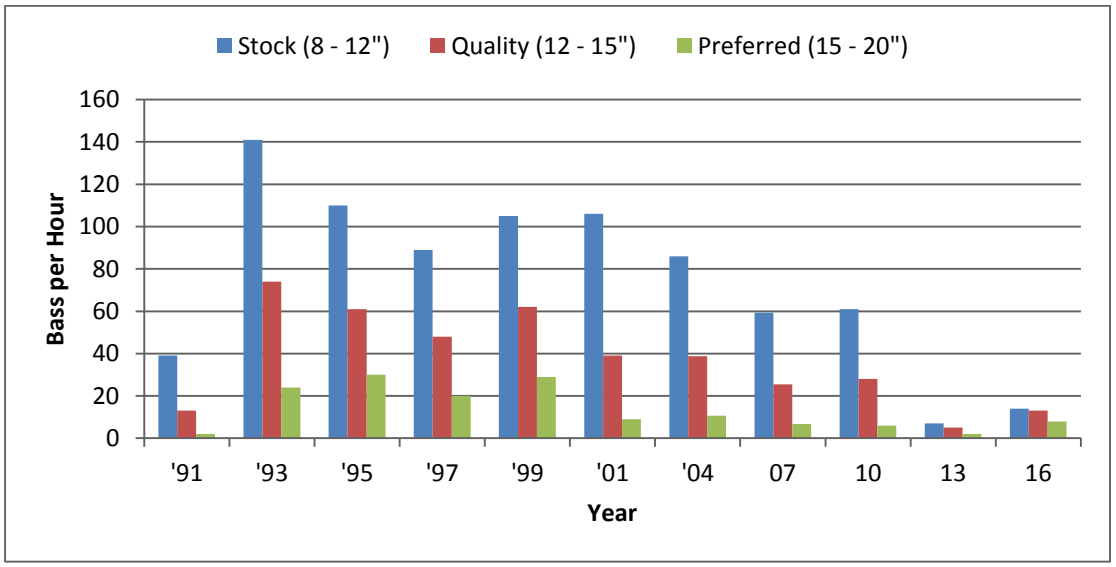

Figure 1. Catch per unit effort (bass per hour) for stock-, quality-, and preferred-size largemouth bass collected from fall electrofishing samples on Bartholomew Lake, LA, from1991 – 2016.

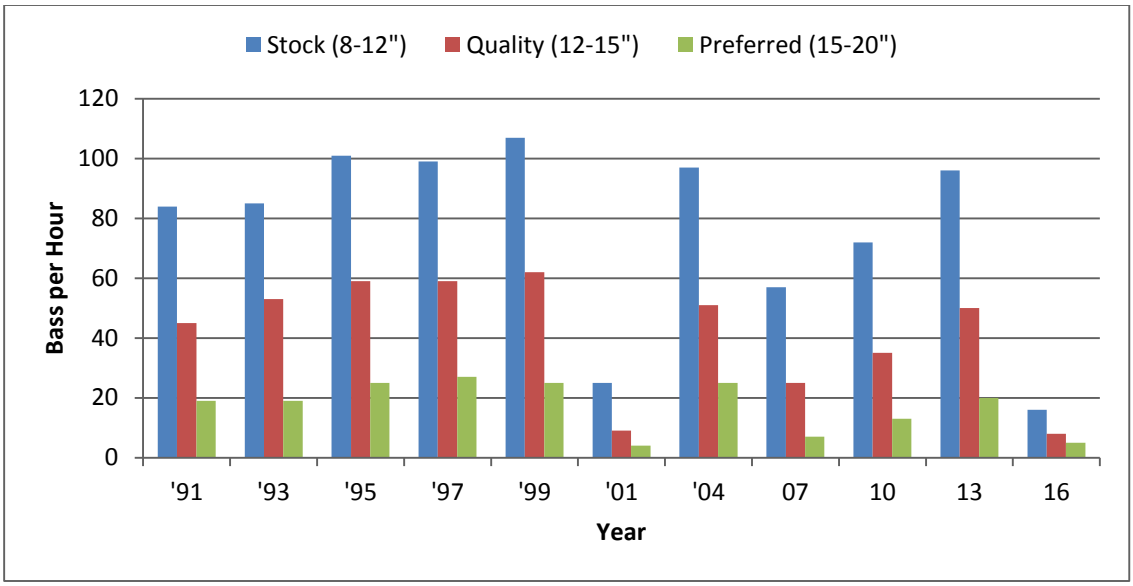

Figure 2. Catch per unit effort (bass per hour) for stock-, quality-, and preferred-size largemouth bass collected from spring electrofishing samples on Bartholomew Lake, LA from 1991 – 2016.

The following charts (Figures 3, 4, 5, 6, 7, and 8) show length distributions in catch-per-hour for largemouth bass for the years 2001, 2004, 2007, 2010, 2013 and 2016, respectively. A fairly balanced population is indicated, in that nearly all of the inch groups from 6 – 18 inches are represented in each sample. However, in all years the most abundant bass in the lake are 10-12" fish. These fish appear to be mostly age 1+ (see figure 8 below), suggesting a relatively high level of recruitment from the juvenile to sub-adult/adult sizes. It should be noted that larger bass (> 20 inches) are not efficiently sampled by electrofishing gear and therefore, may be under represented in these results.

Relative weight (Wr) for each inch group is also shown. This measurement is obtained from fall samples only and is defined as the ratio of a fish's weight to the weight of a ''standard'' fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass relative weight values below 80 may indicate a problem of insufficient or unavailable forage, whereas relative weight values closer to 100 indicate sufficient available forage. A description of the forage species and sampling methods is described below. The relative weights depicted in the charts below show that there appears to be abundant forage in Bartholomew Lake. Relative weights are not shown for 2013 and 2016 due to small sample sizes and high standard error.

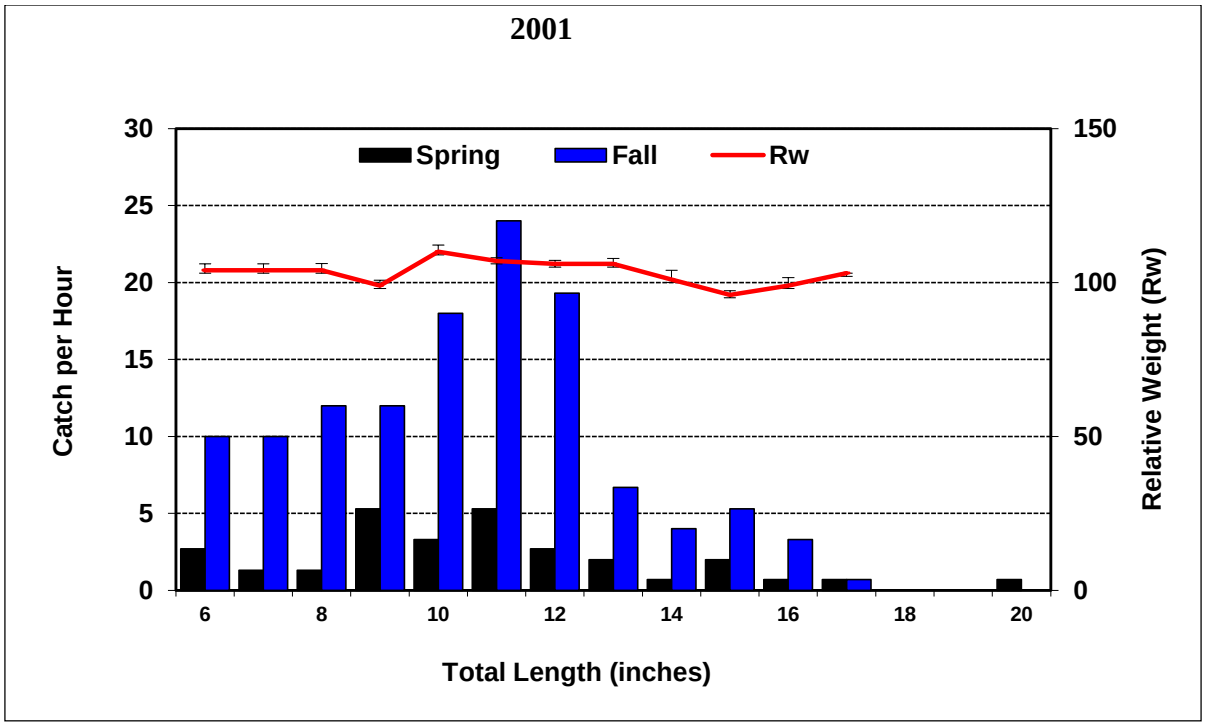

Figure 3. Size distribution (length groups) and mean relative weights (±SE) for largemouth bass in Bartholomew Lake, LA, for the year 2001.

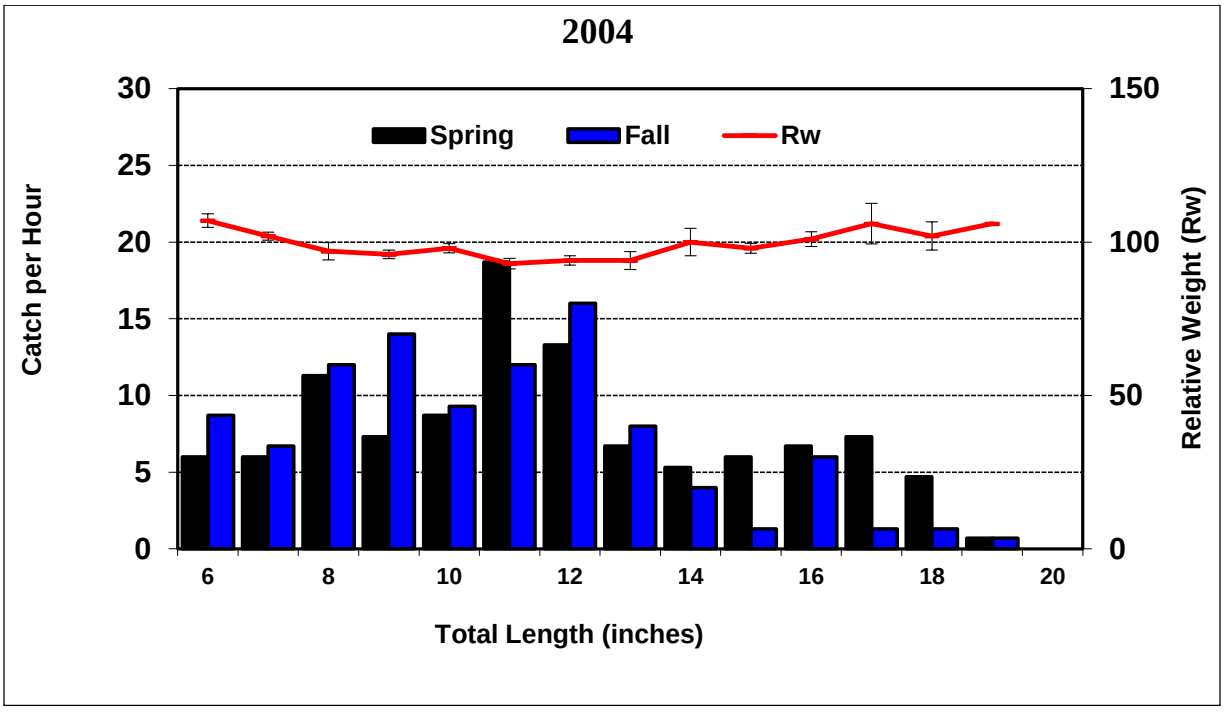

Figure 4. Size distribution (length groups) and mean relative weights (±SE) for largemouth bass in Bartholomew Lake, LA, for the year 2004.

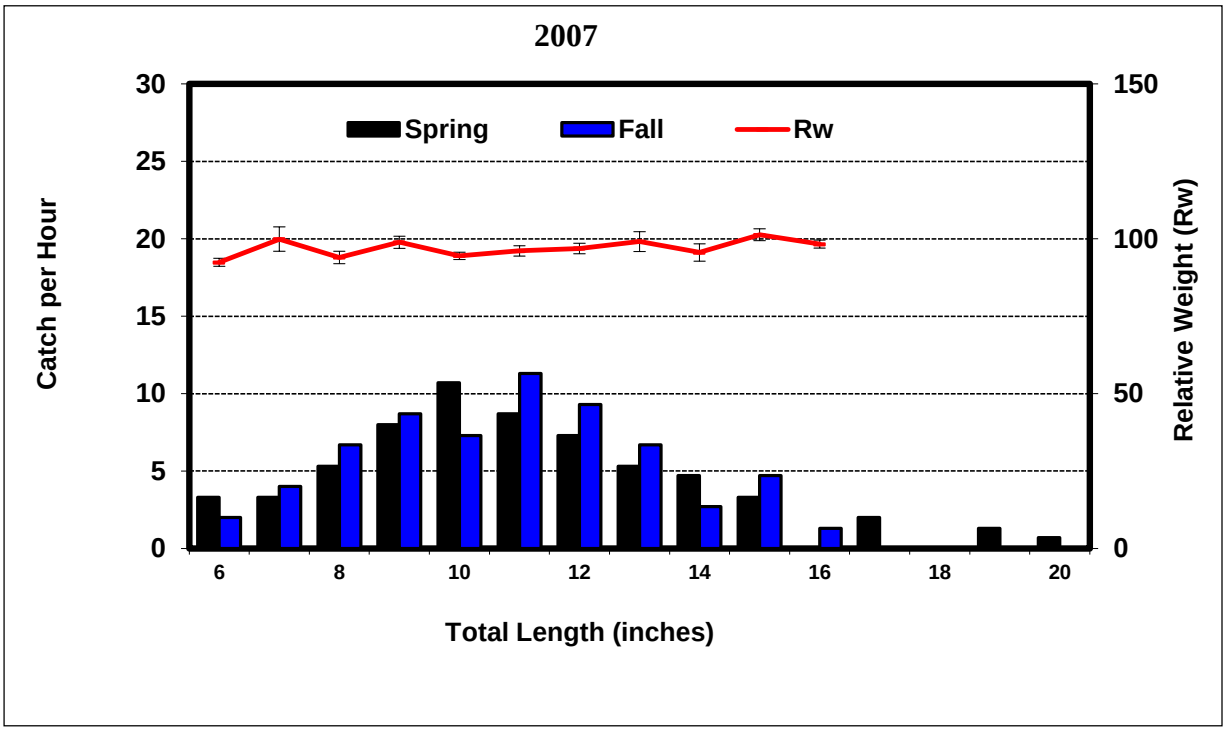

Figure 5. Size distribution (length groups) and mean relative weights (+SE) for largemouth bass in Bartholomew Lake, LA, for the year 2007.

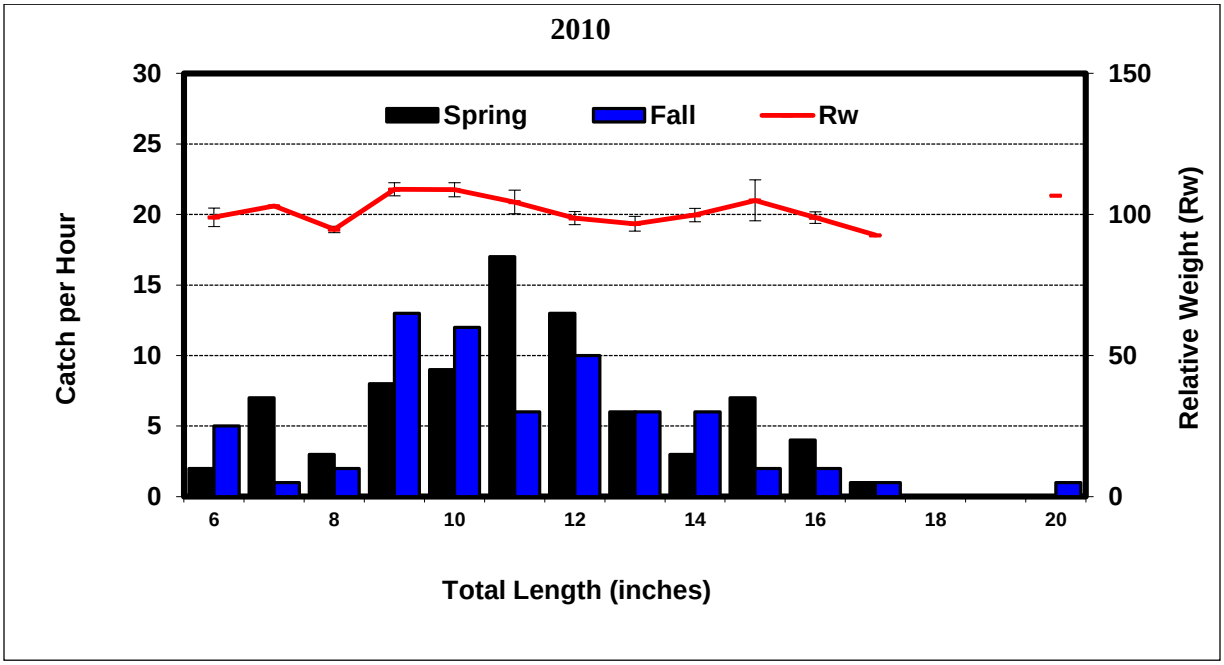

Figure 6. Size distribution (length groups) and mean relative weights (+SE) for largemouth bass in Bartholomew Lake, LA, for the year 2010.

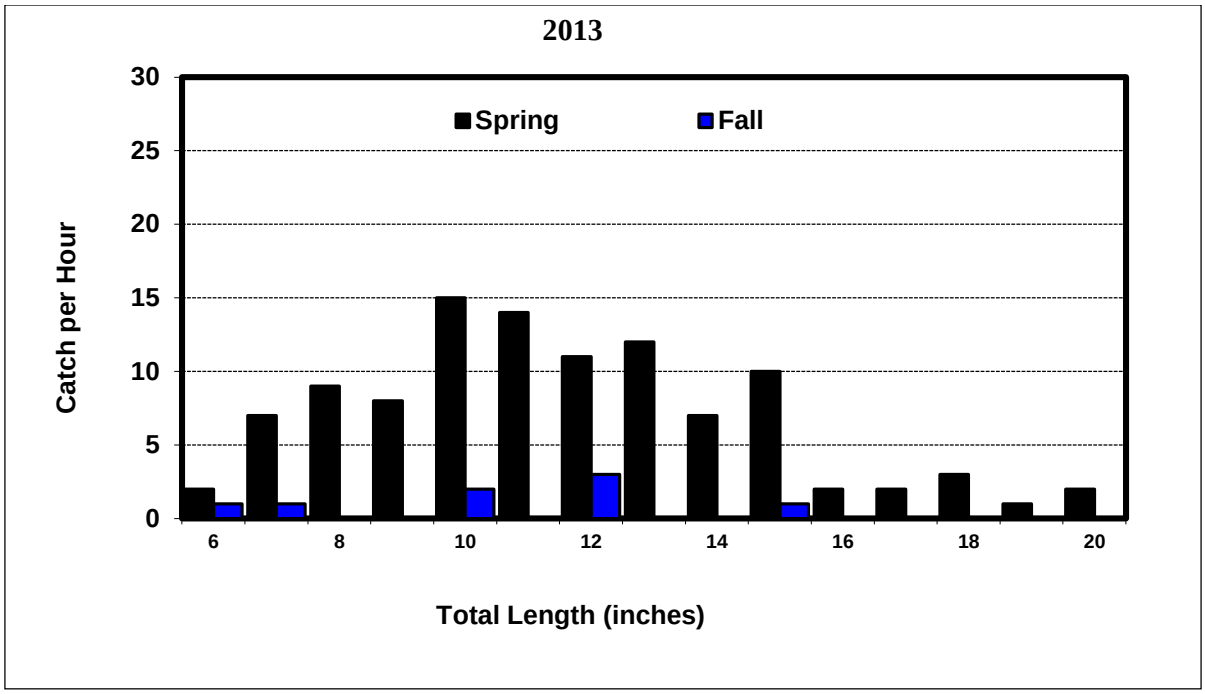

Figure 7. Size distribution (length groups) for largemouth bass in Bartholomew Lake, LA, for the year 2013.

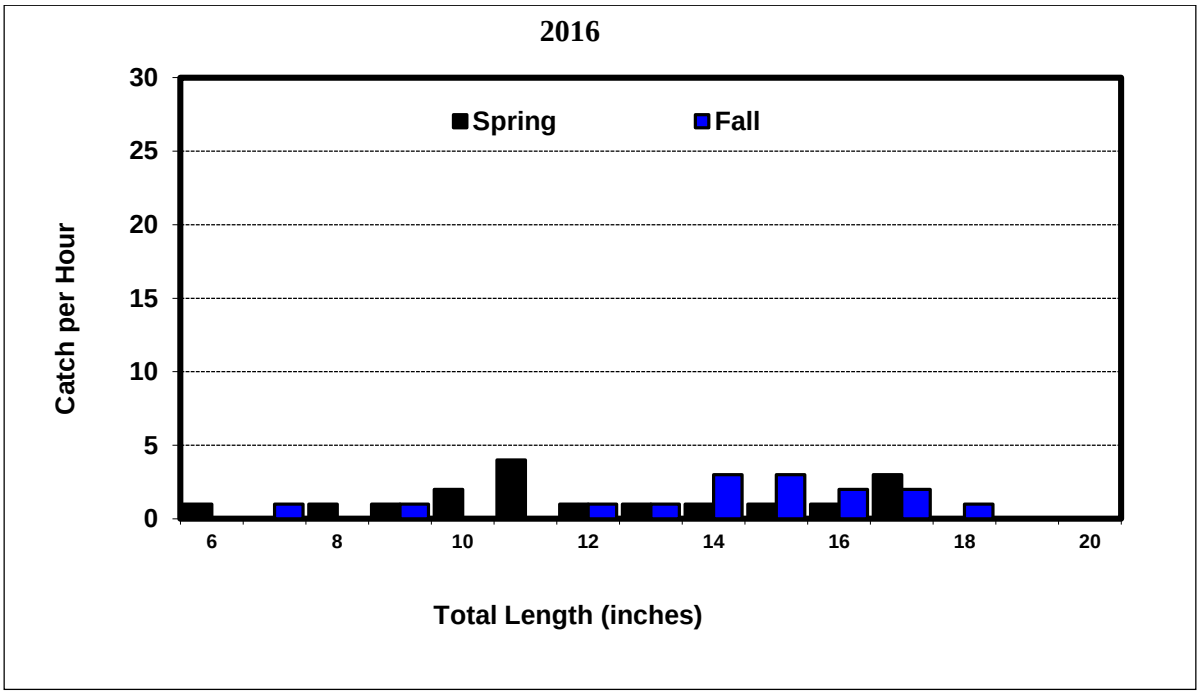

Figure 8. Size distribution (length groups) for largemouth bass in Bartholomew Lake, LA for the year 2016.

Largemouth Bass Genetics

With the exception of one northern largemouth bass stocking in 1972, Florida largemouth bass *M. floridanus* are the only black bass that have been stocked into Bartholomew Lake. Florida bass are typically stocked into waterbodies which are believed to have the potential (fertility and forage) to grow and produce quality size bass. Stocking was initiated in 1991 and discontinued after 1998. No genetic analysis was performed before the Florida bass introductions, but it was assumed that the population was comprised of only northern largemouth bass. A genetic sample taken in 1991 did not reveal the presence of the Florida bass genome in the population. Genetic samples taken in 1994 and 1997 did indicate Florida influence in the largemouth bass population. Samples from 1994 and 1997 were comprised of Florida genetic influence at levels of 18% and 33%, respectively. Genetic sampling was also conducted in 2001 and 2004. Analysis revealed the Florida genome to be present in 25% of the fish sampled. Hybrids (Florida x northern, F1 - Fx) comprised 22% of both samples (Figure 9). Florida bass stockings were discontinued in 1999 and the protected slot limit for bass was removed in 2000. Justification for the change included an insufficient increase in numbers of larger bass and low angler participation.

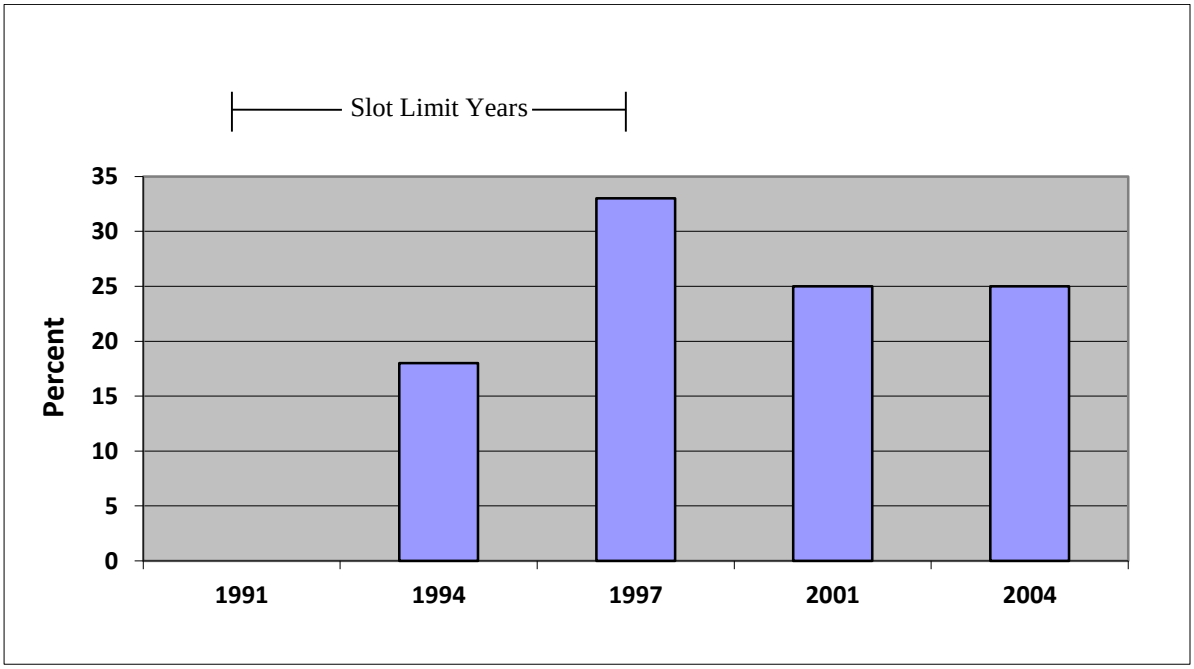

Figure 9. Percentage of Florida bass genome present in largemouth bass populations collected from Bartholomew Lake, LA, in 1991, 1994, 1997, 2001, and 2004.

Largemouth Bass Age and Growth

Age was determined for largemouth bass from fall electrofishing samples taken in 1997, 1999, 2001, and 2004. Mean lengths (mm) at capture for ages 1+ through 4+ are shown in Figure 10. Bartholomew Lake largemouth bass growth is very similar to the statewide average (age 1+ = 262 mm, age 2+ = 335 mm, age 3+ = 384 mm, and age 4+ = 424 mm). Growth appears to have been consistent among cohorts for each sample year. The variability seen in age 4+ fish is most likely due to the small sample sizes of larger fish.

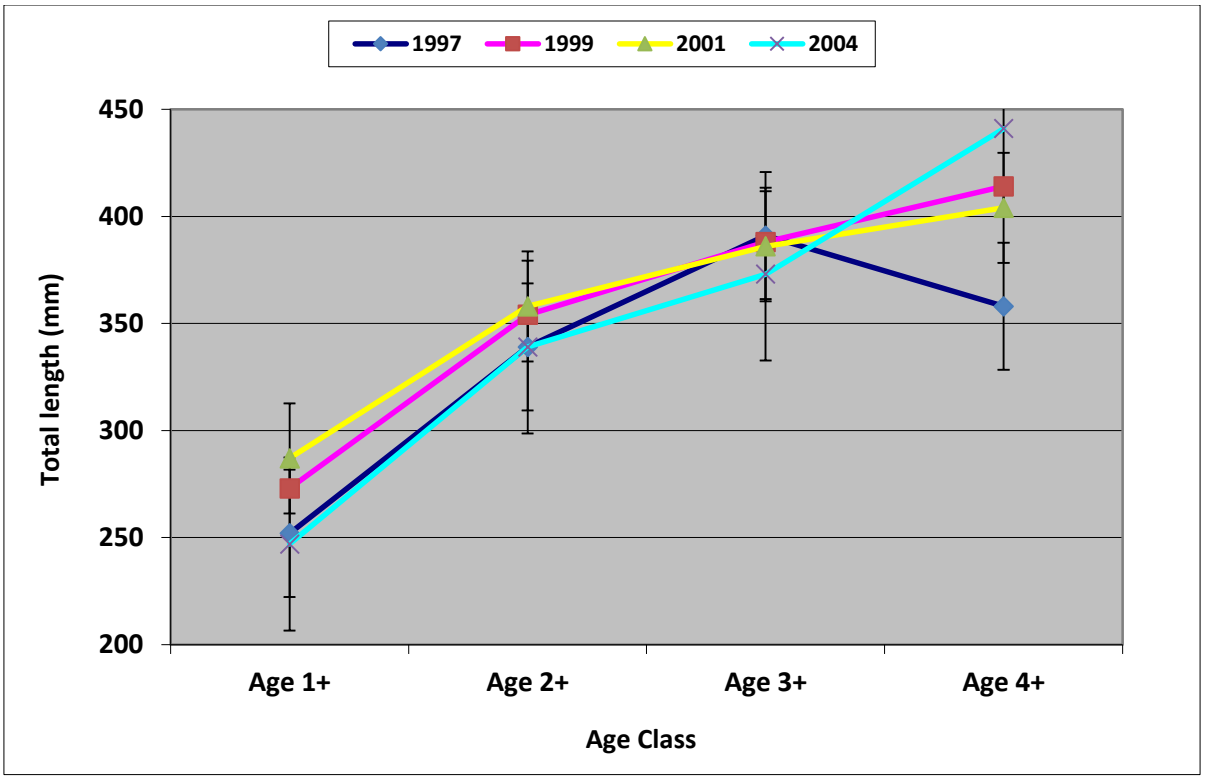

Figure 10. Largemouth bass average total lengths (±SE) for fall electrofishing samples for ages 1+, 2+, 3+, and 4+ from Bartholomew Lake for years 1997, 1999, 2001 and 2004.

Crappie

Crappies (*Pomoxis* spp.*)* had never been specifically targeted for sampling prior to 2013 when lead nets were first utilized in Bartholomew Lake. Both white crappie (*P. annularis*)and black crappie (*P. nigromaculatus)* have been recorded from various sampling gears over the years, including gill netting, electrofishing, and biomass (rotenone) sampling. Catch rates in these samples were not sufficient to draw conclusions regarding the populations. Biomass (rotenone) sampling conducted in 1987, 1991, 1992, and 1995 showed pounds-per-acre of black crappie to be 21, 1, 1, and 0, respectively. Results of the 1992 recreational creel survey estimated that crappie anglers harvested 0.4 crappie/hr, and an estimated total of 3,230 crappie were harvested for that year. The lead net sampling results from 2013 and 2017 revealed a normally distributed population, with both black and white crappie represented (Figure 11). Over 90% of each sample was represented by black crappie. The 2017 sample showed a great abundance of 6 – 9 inch crappie. Age and growth analysis was not conducted, though it appears at least two or three age classes were represented.

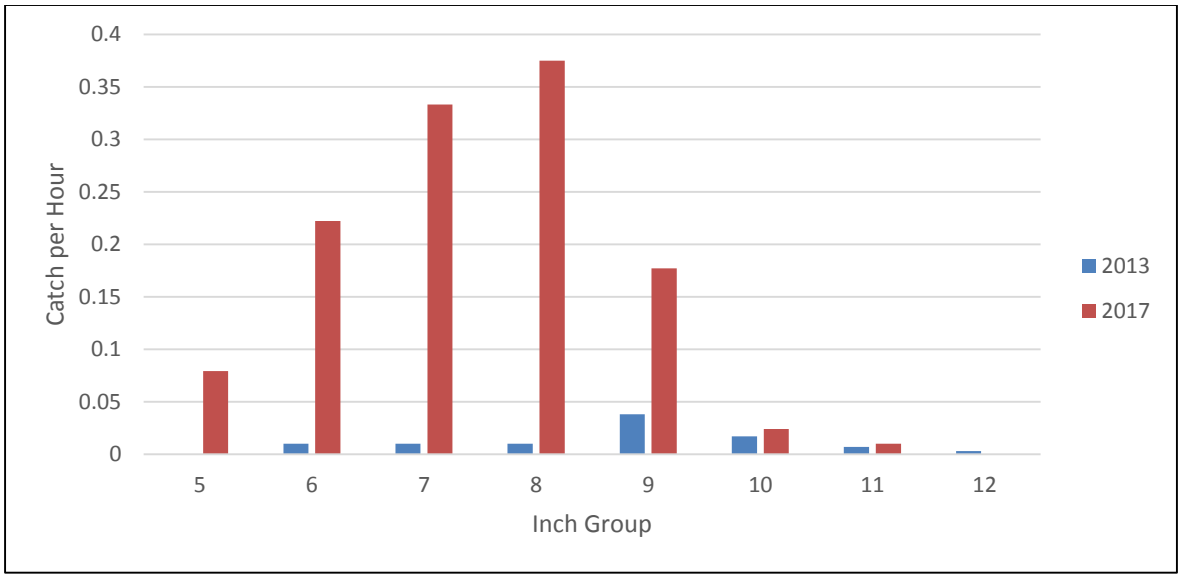

Figure 11. Catch per unit effort (number per hour) of crappie captured during lead net sampling on Bartholomew Lake in 2013 and 2017.

Forage

Sunfish (*Lepomis* spp.*)*, silversides (family Atherinidae*)*, gizzard shad (*Dorosoma cepedianum)*, threadfin shad (*D. petenense)*, and cyprinid minnows or shiners (Cyprinidae) have been identified as the primary bass forage species in Bartholomew Lake. In addition to calculation of largemouth bass relative weights (described above), forage availability has been measured from biomass (rotenone) sampling and shoreline seining. Figure 12 shows pounds/acre of shad, sunfish, and shiners obtained during the last four biomass samples conducted on Bartholomew Lake. Shoreline seining in 1990 and 1991 revealed a total of 24 different species of fish, which could potentially be utilized as forage.

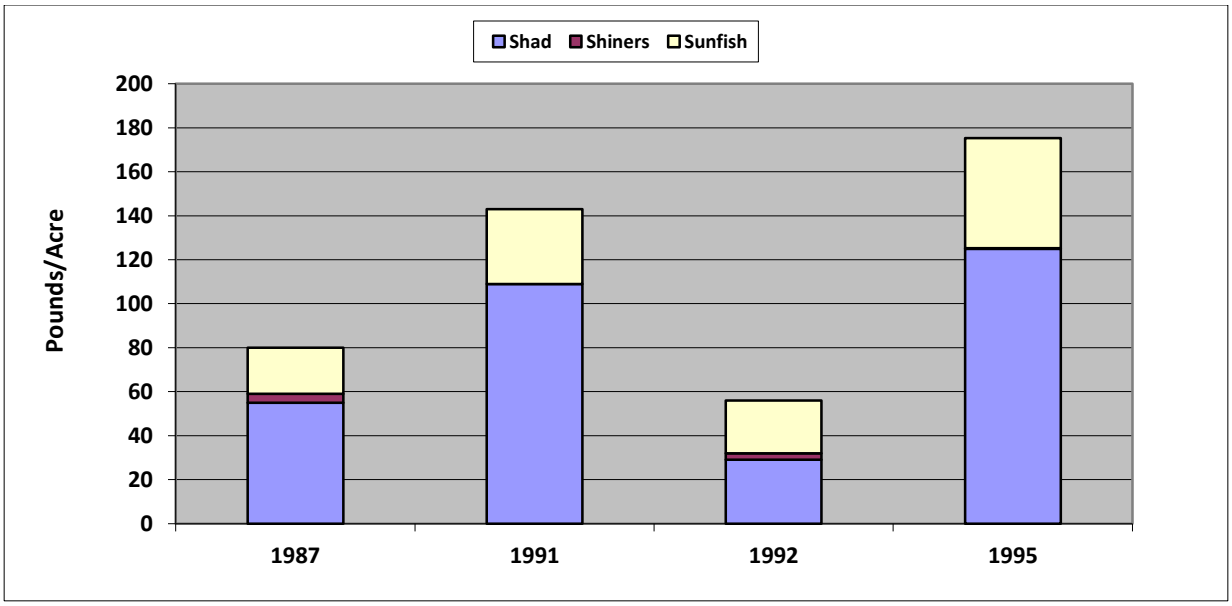

Figure 12. Estimates of shad, shiners, and sunfish from biomass samples taken from Bartholomew Lake, LA, in 1987, 1991, 1992, and 1995.

Sunfish

Bluegill (*Lepomis macrochirus)* and redear sunfish (*L. microlophus)* are the most abundant sunfish species in Bartholomew Lake. Other species documented from forage and seine samples include longear sunfish (*L. megalotis),* dollar sunfish (*L. marginatus)*, spotted sunfish (*L. punctatus)*, and warmouth (*L. gulosus)*. Figure 13 shows the size distributions (total lengths) in CPUE for bluegill and redear sunfish collected during an electrofishing forage sample in fall 2016. Bluegill were again the dominant sunfish species captured during this electrofishing forage sample, though redear, longear, and warmouth were also present. The total number of bluegill and redear collected per hour from forage samples taken in 1997, 1998, 1999, 2010, 2013, and 2016 are shown in Figure 14. Bluegills were much more abundant than redear in each of the samples. The lead net sample results for 2017 also portrayed this trend, as 178 bluegill were captured, while only 6 redear were caught. The species and length distributions of the sunfish indicate an adequate and balanced forage population, as well as a desirable predator-prey relationship.

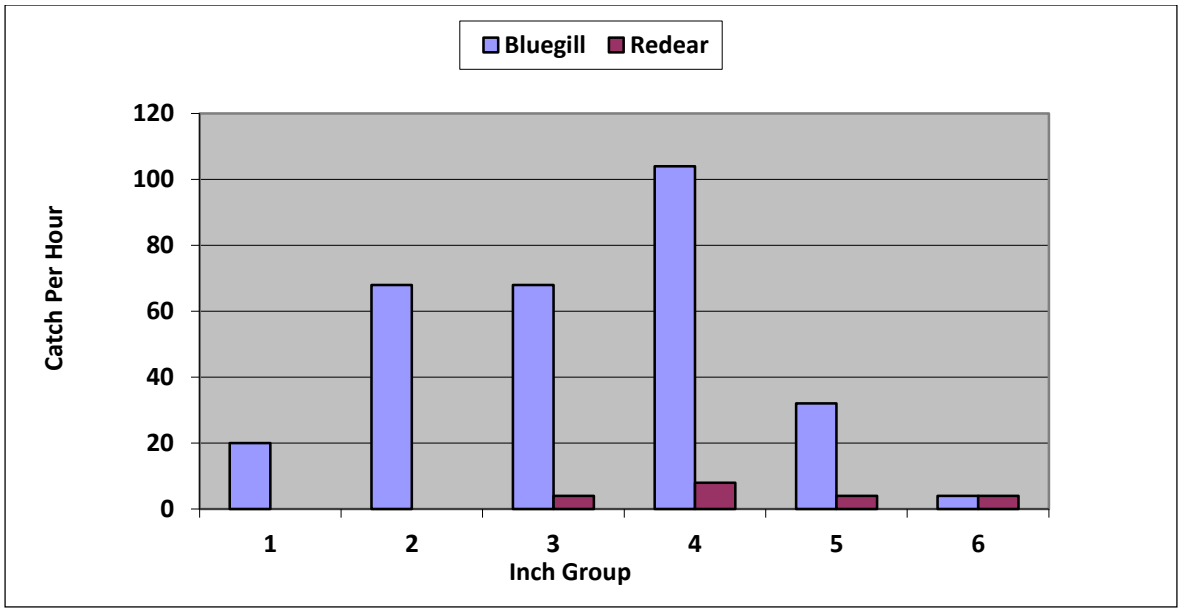

Figure 13. Size distributions of bluegill and redear sunfish collected in fall forage electrofishing samples from Bartholomew Lake, LA 2016.

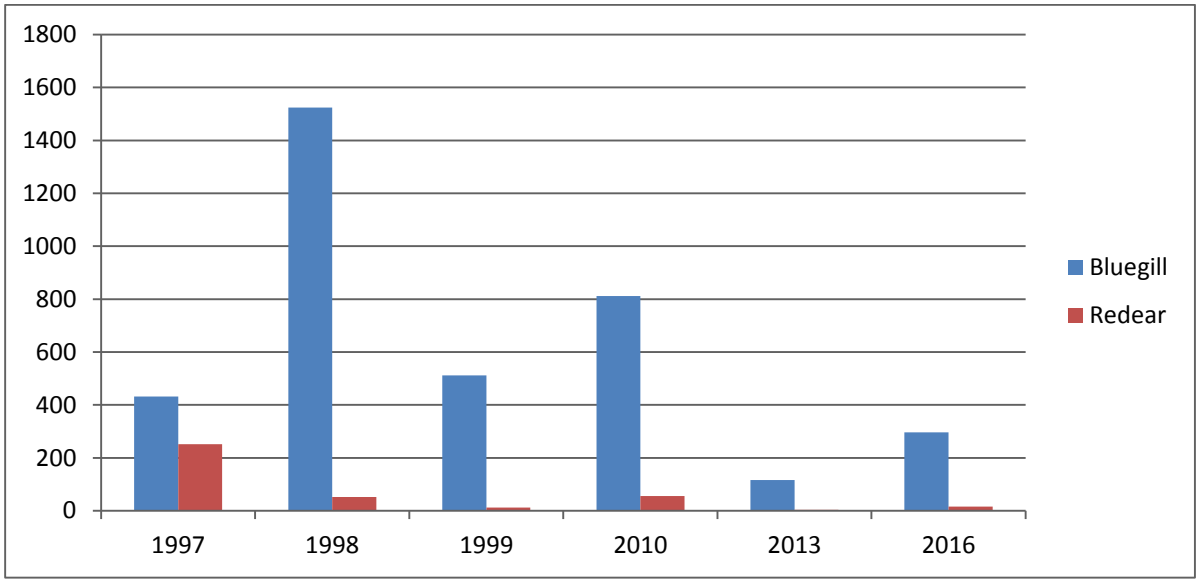

Figure 14. CPUE (number per hour) of bluegill and redear sunfish collected in fall forage electrofishing samples from Bartholomew Lake, LA during 1997, 1998, 1999, 2010, 2013, and 2016.

Recreational Creel Survey

Access point creel surveys of recreational anglers were conducted in 1992 and 1995, coinciding with implementation of a protective slot limit on largemouth bass. A total of 208 and 352 interviews were conducted each year, respectively. Fishing pressure was estimated to

be 41.3 hours/acre/year in 1992 and 37.8 hours/acre/year in 1995. Fishing for largemouth bass accounted for 75% and 81% of the total fishing pressure in 1992 and 1995, respectively. Sunfish and crappie were ranked as the second and third most sought after species, respectively. The estimated total harvest of these species is shown in Figure 15. Harvest for all three was lower in 1995. Catch per hour (CPH) estimates for sunfish were 3.2 and 0.9 for the two years, while bass and crappie CPH estimates were very near 0.4 for both years.

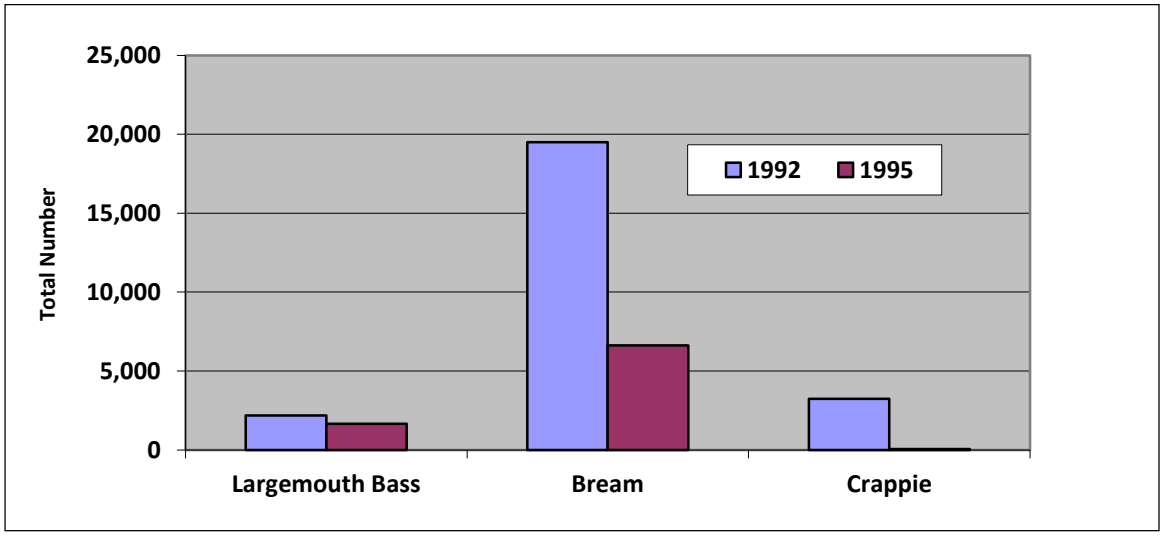

Figure 15. Estimated total harvest of largemouth bass, sunfish, and crappie on Bartholomew Lake, LA from the 1992 and 1995 recreational creel surveys.

The overall harvest rates for largemouth bass were 25.0% and 22.3% for the two years, respectively. Largemouth bass of legal size that were caught and released comprised 36% of the total releases in 1992 and 43% of the total releases in 1995. Of all bass caught, 47% and 45%, in 1992 and 1993 respectively, were within the protective 14 – 17-inch slot limit. Fishing pressure for bass was estimated to be 30.8 hours/acre for both years. Total harvest declined from 2,184 in 1992 to 1,646 in 1995. The percentage of fish caught within the slot limit was nearly the same for both years, yet harvest of legal size fish declined significantly. The reduced harvest of legal size bass was one of the factors that led to the removal of the protective slot limit in 2000.

Commercial

Several commercial fish species have been collected from Bartholomew Lake during biomass and gill net sampling through the years. Although commercial fishing is now prohibited, it does not appear that recent catch effort would support a viable commercial fishery. Table 1 shows the total number of selected species captured from gill net sampling in 2004, 2005, 2008, 2012, and 2015. The low abundance of predatory commercial species (catfish (*Ictalurus spp.)*, flathead catfish (*Pylodictis* spp.) and gar (*Lepisosteus* spp.)) should result in more forage, especially shad, being available for largemouth bass and crappie. The high relative weights of the largemouth bass may be indicative of the low abundance of other predators. Species not included in Table 1, but collected from prior biomass samples include black buffalo (*Ictiobus niger)*, bowfin (*Amia calva)*, common carp (*Cyprinus carpio)*, grass carp (*Ctenopharyngodon idella)*, and spotted gar (*L. oculatus)*. A total of six species that are considered to be

commercially valuable were captured during the 2012 gill net sample, though abundance was not indicated to be high for any of them. These species included common carp, freshwater drum, bigmouth and smallmouth buffalo, and channel and flathead catfish. Only three catfish were captured in three samples in 2015. Figure 16 shows the total pounds-per-acre of commercial species taken from biomass samples conducted in 1987, 1991, 1992, and 1995. The increased catch in 1992 may be a result of an increase in forage availability or productivity in 1991, as shown above in Figure 15. In summary, commercial fish production appears to be variable, but self-sustaining.

Table 1. Total number of selected commercial species captured during gill net sampling on Bartholomew Lake, LA in 2001, 2005, 2008, 2012, and 2015.

Species	2001	2005	2008	2012	2015	Total
Bigmouth buffalo	-	2	1	1	-	4
Smallmouth buffalo	-	2	-	12	-	14
Blue catfish	-	-	12	0	1	13
Channel catfish	3	11	9	12	1	36
Flathead catfish	1	2	2	1	1	7
Freshwater drum	1	6	4	6	-	17

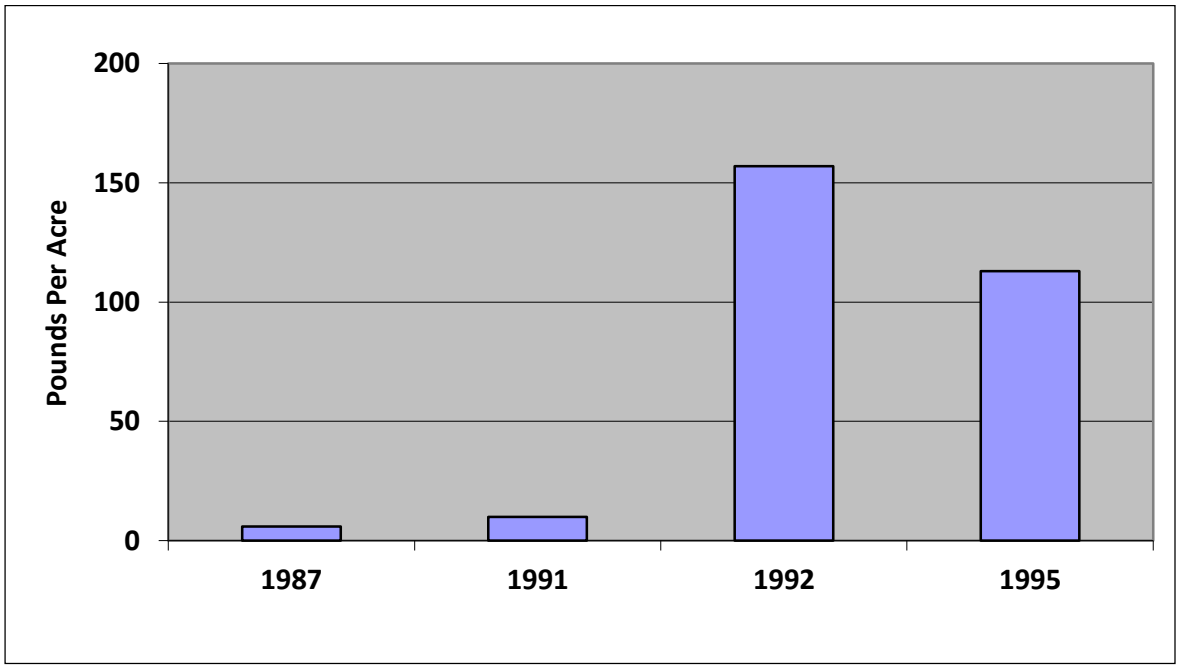

Figure 16. Estimated pounds per acre of commercial species collected from biomass samples on Bartholomew Lake, LA, in 1987, 1991, 1992, and 1995.

HABITAT EVALUATION

Aquatic Vegetation

Aquatic vegetation in Bartholomew Lake has historically been associated with the shoreline

and shallow coves. Emergent vegetation such as alligator weed (*Alternanthera philoxeroides*) and water primrose (*Ludwigia* spp.) has been the most abundant. Water hyacinth *(Eichhornia crassipes*) has been problematic in the past and has formed large mats across the entire width of the impoundment. Coontail (*Ceratophyllum demersum*), a native species, has historically been the most common submerged species, though it has not been considered a nuisance. The water clarity in Bartholomew Lake has typically limited growth of submerged vegetation to depths less than five feet. A qualitative assessment of vegetation in May 2011 showed there to be very little vegetation of any type on the southern half of the lake. The reason for this was unknown; however, it may have been associated with the pump location on the north end. Water clarity was approximately 20 inches on the south end, while it was near 30 inches on the north end. The non-native, invasive species, hydrilla (*Hydrilla verticillata*) was first documented in Lake Bartholomew in 2004 near Barrett's boat launch on the north end. Efforts were made to eradicate the newly introduced plant, but hydrilla coverage expanded to 12 acres by 2009. Despite numerous herbicide applications and the stocking of triploid grass carp, hydrilla coverage reached approximately 70 acres by summer 2014, completely infesting much of the shallows from Barrett's boat launch to the south highline crossing. By summer 2015, approximately 90% of the shoreline was infested to a depth of 6 ft. Following the March 2016 flood, hydrilla was very scarce in the lake. In 2017, coverage of emergent species was below normal, possibly a result of the 2016-2017 drawdown. A small infestation (< 3 acres) of giant salvinia (*Salvinia molesta*) was discovered on the north end in October 2017 and immediately treated with herbicide. Refer to Bartholomew Lake MP-A (updated 2018) for a complete description and history of vegetation control efforts.

Aquatic Vegetation Assessment 11-28-17

A qualitative evaluation of the vegetation on Lake Bartholomew was conducted on November 28, 2017 to evaluate recent herbicide treatments on giant salvinia and to assess the overall status of all species of vegetation on the lake. A minimal amount of giant salvinia was observed amongst dead emergent vegetation on the north end of the lake. Very little submerged vegetation was seen anywhere. One individual hydrilla plant was seen amongst the dead emergent vegetation. A patch of American lotus has reached approximately 20 acres near the north highline crossing. Water hyacinth was scattered throughout the lake, mostly along the shoreline, not forming any mats. Emergent vegetation (mostly alligator weed) was mostly dead (from herbicide and recent frost), but coverage was not excessive and limited to shorelines and shallow protected pockets on the north end of the lake. Currently, no species were determined to be at problematic amounts.

Coverage and Status of Problem Plant Species (2017)

Hydrilla – minimal, likely less than 1 acre total (compared to estimated 100 acres in 2015). It is believed to have been greatly reduced by the flood of March 2016, in which water levels reached nearly 5 feet above pool stage and remained above normal for several weeks. The drawdown during winter of 2016/2017, along with multiple introductions of grass carp in recent years, may have also impacted its coverage.

Water Hyacinth (*Eichhornia crassipes*) - 10 acres

Alligator weed (*Alternanthera philoxeroides*), water pennywort (*Hydrocotyle* spp.*)*, and water

primrose (*Ludwigia* spp.) – the most common emergent species (estimated 20 acres); moderate amounts along much of the shoreline of the northern half of lake

Filamentous algae (*Pithophora* spp.*)* – minimal coverage on water surface, typically held in place by other species

Duckweed *Lemna* spp. – minimal; growing amongst other emergent species; not problematic

Common salvinia – 3 to 5 acres at maximum coverage; typically growing amongst duckweed;

Giant salvinia – 3 to 5 acres at maximum coverage; first detected in October 2017 on north end of lake, treated immediately

Coverage and Status of Beneficial Plant Species (2017)
Coontail – less than 10 acres; now the dominant submerged species, found in depths up to three feet, widely scattered throughout the lake

American lotus (*Nelumbo lutea*) – 20 acres; a native species, but sometimes requires control when large mats form or navigation is impeded; mostly in flats around north highline crossing

Predicted Vegetation Coverage for 2018

It is unknown how the hydrilla will respond following its significant reduction in 2016 and 2017, though it is expected to remain suppressed due to the presence of grass carp. Total coverage of coontail is expected to expand, especially in depths between 3 and 6 feet. The drawdown of nearly 3 feet reduced the coverage of shoreline emergent species and shallow submerged species, though this reduction was likely only temporary. These species are expected to return to previous "normal" amounts in 2018. Water hyacinth was observed throughout much of the lake in late November 2017 (approximately 20 acres), though not problematic in any areas. If not controlled by freezing conditions during winter, it's coverage will likely expand in 2018 and require treatment. Both salvinia species will continue to be a priority for herbicide control in 2018.

Substrate

The natural substrate of Bartholomew Lake is mostly clay, typical of low order streams of the Ouachita River Basin. Silt has been deposited on top of the natural stream bottom from many decades of agricultural erosion. The senescence of aquatic vegetation and accumulation of leaf litter from surrounding trees has added organic material to the lake bottom. Without any significant flow or natural fluctuations of water level, these materials have most likely caused degradation of fish spawning habitat and decreased water depth in some areas. This accretion does not appear to be an imminent threat to the health of the impoundment.

Available complex cover

The most prominent forms of complex cover in Bartholomew Lake are live bald cypress (*Taxodium distichum*) trees and submerged woody material. Cypress trees are common in the shallow areas, while the woody material is found along the edge of the original creek channel. Submerged vegetation provides shallow water complex cover, with coontail and hydrilla being

the dominant species. Numerous residential piers also comprise a significant component of the available cover in the waterbody.

Artificial Structure

No artificial structure has been placed into Bartholomew Lake by LDWF.

CONDITION IMBALANCE / PROBLEM

The lack of significant and regular water level fluctuation poses the greatest threat to the fisheries habitat of Bartholomew Lake. Until the drawdown of 2017-2018 (primarily for flood damage repairs), there had been no documentation of a significant drawdown on this waterbody since it was impounded in the 1930's. The degradation of the natural substrate by agricultural siltation and accumulation of organic materials may be impacting the spawning success of several species of fish. Routinely dewatering the shallow shoreline areas, thus exposing them to air, would accelerate the decomposition process and reduce organic detritus. Results would likely include improved water quality and increased fish spawning success.

CORRECTIVE ACTION NEEDED

Bartholomew Lake could benefit from water level fluctuations to expose fish spawning areas and allow for more rapid decomposition of the organic substrate. Drawdowns of this nature would provide the additional benefit of hydrilla control.

RECOMMENDATIONS

Frequent drawdowns of Bartholomew Lake are recommended for the following purposes: control of excessive coverage of nuisance vegetation when present, fisheries habitat improvement, and to allow homeowners an opportunity to repair piers and seawalls. An optimal drawdown would lower the lake level to a depth five feet below pool stage, beginning Sept. 1 and continuing for a minimum of three months. Dewatering rate should not exceed four inches per day.

The drawdown recommendation as described above is submitted as the preferred management recommendation. However, if the extent and timing of the recommended drawdown are not compatible with Monroe Municipal Water Supply needs, LDWF staff will remain available for consideration of alternative water level fluctuation that is compatible.

Grass Carp: A total of 750 grass carp were stocked in April 2013 and an additional 700 were stocked in 2015. Though hydrilla coverage is currently insignificant, grass carp survival and vegetation consumption should be evaluated for the next 5 years. Grass carp condition and abundance will be evaluated from samples collected by gill net sampling.

Herbicide Applications: Treatment of nuisance vegetation with herbicides in Lake Bartholomew will continue on an as-needed basis based on observations by LDWF personnel and reports from the general public or other authorities. The control of the newly found infestation of giant salvinia on Lake Bartholomew will become a priority. Control will be achieved by frequent visits by LDWF spray crews using Department recommended herbicides and application procedures. See below for specific recommendations.

Herbicides that require extended exposure to vegetation at a designated concentration (Ex. Fluridone or penoxsulam) are not applicable for this situation. Continuous pumping for municipal water needs creates inadequate water retention time.

Type map surveys should be conducted semi-annually to evaluate the status of aquatic vegetation.

Water Hyacinth and American Lotus will be treated as follows:

March 15 – Sept. 15 – glyphosate (0.75 gallons/acre) with a 90:10 non-ionic surfactant (0.25gal/acre)

Sept. 16 – March 14 – 2,4-D (0.5 gallons/acre) with a 90:10 non-ionic (1 pt/acre)

Other Emergent species will be treated as follows:

Residential areas - imazamox (0.5 gal/acre) with Turbulence surfactant (or approved substitute, 0.25 gal/acre)

Undeveloped areas - imazapyr (0.5 gal/acre) with Turbulence surfactant (or approved substitute, 0.25 gal/acre)

Salvinia species (giant or common) will be treated as follows:

Between April 1 and October 31: glyphosate (0.75 gal/acre), diquat dibromide (0.25 gal/acre), Turbulence surfactant (or approved substitute, 0.25 gal/acre)

During the winter: a mixture of diquat dibromide (0.75 gal/acre) and the appropriate non-ionic surfactant (0.25 gal/acre) will be used.

Hydrilla will be treated as follows:

Surface and subsurface applications of a tank mixture of Cutrine®-Plus (chelated copper) and diquat dibromide at a ratio of 3:2, respectively. The mixture will be applied at the rate of 5.5 gallons per surface acre of hydrilla. An alternative mixture is to apply only diquat dibromide on the surface and by subsurface injection at a rate of 2.0 gallons per acre. Areas in the vicinity of the public boat launch and the culvert which connects Lake Bartholomew with Bayou DeSiard will be treated as needed. Liquid endothall (Aquathol K) may also be used, especially at severely impacted sites. A concentration of 4 ppm was effective during a treatment in 2015.